Methods: Sequentially enrolled 257 patients that diagnosed with atrial fibrillation in the First Affiliated Hospital of Dalian Medical University from March 2011 to September 2013, and score to each patient according to the standard of $CHADS_2$ and CHA_2DS_2-VASc scoring system. $CHADS_2$ scoring system: C: congestive heart failure, 1 point; H: hypertension, 1 point; A: age≥75 years, 1 point; D: diabetes, 1 point; S: stroke or transient ischemic attack history, 2 points, 6 points in all. CHA_2DS_2-VASc scoring system: C: congestive heart failure, 1 points; H: hypertension, 1 point; A: age between 65-74 years, 1 point; D: diabetes, 1 point; S: stroke or transient ischemic attack history, 2 points; V: vascular disease, 1 point; A: age≥75 years, 2 points; S: female, 1 point, 9 points in all. Patients were divided into low, medium and high-risk groups according to the score 0, 1 and ≥2 points. After admission, each patient underwent transesophageal echocardiography examination. Pulmonary venous flow (S peak, D peak, A peak), the maximum speed of the left atrial appendage (LAA) emptying velocity, LAA entrance width, LAA depth, thrombus and spontaneous echo contrast (SEC). We analysis the correlation of TEE parameters and thromboembolic risk scoring systems by using Spearman rank.
Results: (1) The patients in low, medium and high-risk group according to $CHADS_2$ score were 80 (31.1%), 93 (36.2%), 84 (32.7%), respectively. The TEE indexes that have a significant correlation with $CHADS_2$ score are: LAA entrance width (35.53±2.47mm vs 35.89±0.90 mm vs 36.79±2.51 mm, P<0.001), LAA emptying velocity (23.36±3.02 cm/s vs 23.03±2.00 cm/s vs 20.96±4.42 cm/s, P<0.001), thrombus (0.00±0.000 vs 0.00±0.000 vs 0.06±0.24, P<0.001), SEC (0.00±0.000 vs 0.00±0.000 vs 0.07±0.26, P<0.001). There is some correlation between $CHADS_2$ score and LAA width/depth (2.26±0.22 vs 2.30±0.12 vs 2.42±0.37, P= 0.022). (2) The patients in low, medium and high-risk group according to CHA_2DS_2-VASc score were 47 (18.3%), 69 (26.8%), 141 (54.9%), respectively. The TEE indexes that have a significant correlation with CHA_2DS_2-VASc score are: LAA depth (35.37±3.17 mm vs 35.88±0.56 mm vs 36.40±2.12 mm, P<0.001), LAA emptying velocity (23.75±3.15 cm/s vs 22.93±1.87 cm/s vs 21.79±3.91 cm/s, P<0.001), thrombus (0.00±0.000 vs 0.00±0.000 vs 0.04±0.186, P<0.001), SEC (0.00±0.000 vs 0.00±0.000 vs 0.04±0.203, P<0.001). The TEE indexes that have some correlation with CHA_2DS_2-VASc score are: LAA width/depth (2.24±0.24 vs 2.32±0.08 vs 2.36±0.32, P=0.020), pulmonary venous flow A peak (25.57±4.43 cm/s vs 24.81±2.82 cm/s vs 24.29±4.51 cm/s, P=0.031).
Conclusions: With the $CHADS_2$ and CHA_2DS_2-VASc score increased, TEE parameters showed the increase of the LAA depth, the decrease of LAA emptying velocity, the increase of thrombus and SEC. In addition, pulmonary venous flow velocity A peak is correlated with CHA_2DS_2-VASc score. It prompted that the TEE indexes such as pulmonary venous flow, LAA emptying velocity, LAA entrance width, LAA depth, thrombus and SEC may be the identification index of thromboembolism risk in non-valvular atrial fibrillation patients.

GW25-e2260

Pre-excitation syndrome: the clinical significance of the change of terminal QRS vector

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Objectives: The change of initial QRS vector is mainly emphasized in the ECG of pre-excitation syndrome. The ECG diagnosis and localization of accessory pathway (AP) are mainly based on delta wave. Both initial QRS vector and the terminal QRS vector are affected by the antegrade conduction of AP. However the effect of pre-excitation on terminal QRS vector is usually ignored by clinicians. In this study, we made the comparison of ECG pre and post ablation during sinus rhythm in cases with AP capable antegrade conduction (overt and latent pre-excitation), further explored the effect of pre-excitation on terminal QRS vector and its clinical significance. Furthermore, the relationship between the change of terminal QRS vector and AP location was analyzed.
Methods: In the study, 158 cases who were proved to have a single AP capable antegrade conduction by ablation were included. All cases were divided into 2 groups according to the ECG characteristics pre ablation. In overt group, there were 150 cases (there was classical pre-excitation on the ECG), who were divided into 9 subgroups based on AP location (32 were left anterior AP, 33 were left lateral AP; 23 were left posterior AP; 7 were right anterior AP; 12 were right lateral AP; 18 were right posterior AP; 5 were right anteroseptal AP; 8 were right midseptal AP; 12 were right posteroseptal AP). In latent group, 8 cases (delta wave was not visible on the resting ECG, but it was detected during transesophageal atrial pacing) were included. (1) ECGs before and after ablation were examined in overt group. The effect of pre-excitation on terminal QRS vector was observed. Furthermore, the relationship between the change of terminal QRS vector and AP location as well as delta wave was analyzed. (2) In latent group, ECGs pre and post ablation as well as during atrioventricular reentrant tachycardia were analyzed. In cases with a change of terminal QRS vector, the relationship between initial V wave derived from target site (activated via AP) and the onset of the QRS complex on the surface ECG (activated by AV nodal pathway) was analyzed.
Results: (1) In overt group, 150 cases had a change in terminal QRS vector in comparison to the ECG post ablation. Of these 150 cases, 126 (84.0%) had a change in polarity and 24 (16.0%) had a change in amplitude. The change of terminal QRS vector was related to AP location and delta wave. (2) In latent group (8 cases), 6 cases had no change in terminal QRS vector, suggesting failure conduction of AP (latent pre-excitation). The remains of 8 cases had a change in terminal QRS vector. The initial V wave derived from target site in an electrophysiological study and the onset of the QRS complex on the surface ECG appeared nearly at the same time, indicating that the activation from AP is nearly in synchronism with activation from AV nodal pathway (temporarily termed as the incomplete latent pre-excitation).
Conclusions: (1) Both initial QRS vector and terminal QRS vector are affected by the antegrade conduction of AP. (2) The presence of a delta wave indicates that AP conduction is faster than AV node conduction. (3) The change of terminal QRS vector is the hallmark of antegrade conduction via the AP. The pre-excitation mainly manifest the change of terminal QRS vector, which is termed as the incomplete latent pre-excitation syndrome. The change of terminal QRS vector detected by comparing with ECG during AVRT is helpful for the diagnosis of pre-excitation syndrome with no evident delta wave.

GW25-e5209

Study on the changes of ambulatory electrocardiogram before and after military training in volunteers

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Objectives: To investigate the changes of multiple-indexes by amublatory electrocardiogram before and after 3km military training in volunteers and explore the effect of large intensity training to electrophysiology, then provide the basis for the myocardial injury and exercise-related sudden death which are caused by the long-term and large intensity training.
Methods: 160 health male volunteers were selected, whose age was (20±2) years old. Using the MIC-12H dynamic electrocardiogram (jinco Medical Equpment Co, LTD, Beijing) to record 24 hours. Firstly, the electrocardiogram was detected for 24 hours the day before the training, then the electrocardiogram was tested again immediately after the training which was required to complete in 15 minutes, and the data was analyzed offline by the specialist. The Heart Rate (HR), Deceleration Capacity (DC) time, domain Heart Rate Variability (HRV) parameters (SDNN) and T wave alternans (TWA) were measured and compared respectively before and after 3km military training by ambulatory electrocardiogram. And the changes of the arrhythmia such as Premature atrial and ventricular Beats were observed.
Results: (1) HR (71.89±6.70/m beats per minute) after 3 km military training was higher than that (68.97±6.88 beats per minute) before the training (P<0.001). (2) DC (11.63±3.45) after the training decreased markedly (P<0.001) compared with (12.68±3.36) in pro-training group. (3) The time domain indexe SDNN of HRV (201.96±36.97 ms) after the training were more higher (P<0.001) than those 193.01±34.44 before the training. (4) The rate of TWA were not changed (P>0.05), but there was a significant increase in the incidence rate (P<0.001) of the arrhythmia such as premature atrial (4.2%) and ventricular beats (3.03%).
Conclusions: The test of DC is a valuable indicator to predict the risk of cardiac sudden death in training. This study suggested that whether the deceleration of DC would increase the risk of exercise-induced sudden death, we also need further attention. And the increasing of HRV indexes and HR improved the integral function of the independent nerve system. But the increase of premature atria and ventricular beats, the risk of malignant arrhythmia could not exclude. So we should pay attention to monitor the indexes of DC and arrhythmia, and giving an early warning to exercise-induced sudden death.

GW25-e1673

Study of Three Different Kinds of Approaches to Permanent Pacemaker Implantation

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Objectives: To evaluate the success ratio, safety and utility of three different kinds of approaches to permanent pacemaker implantation.
Methods: Three different groups were made as follows: directly under fluoroscopy in anatomical localization, 59 patients were punctured in axillary vein and implanted electrodes wire; 55 patients were implanted the electrodes wire with the subclavian vein puncture; 48 patients with intravenous injection of contrast agent to locate the axillary vein and with electrodes wire implanted.
Results: The success ratio of the way with directly bony landmarks to locate and puncture in axillary vein and implant electrodes under X ray was the highest in these three groups. And the complication in this group was also least in operation. In addition, the times and the time consuming of vein puncture, and time of X-ray exposure all were similar to the other two groups.
Conclusions: The method of puncturing axillary vein and implanting electrodes under X ray with directly bony landmarks is safe, easy and reliable with higher successful rate and less complications. This method could instead of the way with the subclavian vein punctured and the way through injection of contrast agent to locate the axillary vein and puncture in axillary vein. In clinical, this method would be the conventional method for the implantation of electrode wire of permanent pacemaker.

GW25-e1734

A consistency study of interventricular delays optimization for cardiac resynchronization therapy by modified intracardiac electrogram-based method and echocardiography

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Objectives: To investigate the consistency of interventricular delays optimization for cardiac resynchronization therapy by modified intracardiac electrogram

(IEGM) -based method and echocardiography and assess whether the acute hemodynamic effects achieved by modified IEGM-based method are more effective and more accurate comparing with the traditional IEGM-based method.
Methods: A total number of 20 patients with congestive heart failure implanted with IEGM-based functioned CRT/CRT-D were enrolled. The follow-up period for all the patients after CRT was 1, 3 and 6 months. Modified IEGM -based method, traditional IEGM -based method and echocardiography respectively was used to achieve the optimized VV delays and assessed the improvement degree of acute hemodynamic effects by the three different methods.
Results: The results showed the optimized VV delays achieved by modified IEGM-based method have better agreement and correlation with the echocardiographic optimization comparing with the traditional IEGM-based method. The parameter of left ventricular ejection fraction (LVEF) by modified IEGM-based method was independently related to more favorable outcomes than the traditional echocardiography during the 1, 3 and 6 months follow-up period (0.31±0.07 vs 0.29±0.08, 0.37±0.07 vs 0.34±0.08, 0.45±0.07 vs 0.42±0.08 P<0.05). Moreover, the degree of the mitral regurgitation decreased markedly by modified IEGM-based method in 6 months follow-up after CRT (2.08±1.78 vs 2.64±2.37, P<0.05). However, there was no statistically significance between the traditional IEGM method and modified IEGM-based method in A Wave Velocity-time Integral (VTI_{Ao}) and the degree of the mitral regurgitation in 1, 3 months follow-up after CRT (P>0.05).
Conclusions: (1) The optimized VV delays achieved by modified IEGM-based method have better agreement and correlation with the echo optimization comparing with the traditional IEGM-based method. (2) The optimized VV delays achieved by modified IEGM-based method have better acute hemodynamic effects.

GW25-e2222

Relationship of Thickness of Left Atrial Epicardial Adipose Tissue and Atrial Fibrillation

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Objectives: Obesity is an important risk factor for atrial fibrillation (AF). Epicardial adipose tissue in close anatomic proximity to cardiac structures and autonomic fibers, is a source of several inflammatory mediators related to the genesis of AF. This study is aimed to investigate the relationship of thickness of left atrial epicardial adipose tissue and atrial fibrillation.
Methods: 150 consecutive hospitalized patients with AF from the January 2008 to January 2009 underwent 16-slice spiral CT as the experimental group (48 (32%) patients with persistent AF, 102 (68%) patients with paroxysmal AF). 131 cases of non-AF patients in our outpatient for 16-slice spiral spiral CT as a control group. In a short-axis view of the mid-left atrium (LA), periatrial epicardial adipose tissue was measured at the esophagus (LA-ESO), main pulmonary artery (LA-PA), and thoracic aorta (LA-TA). Axial plane measurement of the anteroposterior diameter, sagittal measurement of the vertical diameter were performed as the LA diameter.
Results: Left atrial epicardial adipose tissue thickness in patients with persistent atrial fibrillation increased than that in patients with paroxysmal atrial fibrillation and without atrial fibrillation (all P value less than 0.05). Epicardial adipose tissue thickness in patients with persistent atrial fibrillation increased than that in patients with paroxysmal atrial fibrillation (all P value less than 0.05). Adjusted for age, sex, hypertension, diabetes, BMI and left atrial size, left trial epicardial adipose tissue thickness had relationship with AF history duration and AF burden.
Conclusions: Left atrial epicardial adipose tissue thickness was independently associated with AF duration and AF burden.

GW25-e2379

Substrate-guided Catheter Ablation of Electrical Storm after Implantation of Implantable Cardiovertor Defibrillator

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Objectives: To summarize the experience and outcomes of radiofrequency catheter ablation (RFCA) of electrical storm after implantation of implantable cardiovertor defibrillator (ICD-ES).
Methods: We reviewed 5 cases of ICD-ES who underwent RFCA guided by 3D mapping systems. All the patients received endocardial mappings, while selected patients received epicardial mappings. Both activation and substrate mappings were obtained for hemodynamically stable and persistent VTs, while only substrate mappings were obtained for hemodynamically unstable or impersistent VTs. Areas of dense scars (voltage <0.5 mV) and transitional zones (TZ, voltage between 0.5 to 1.5 mV) were calculated. Ablation targets included: (1) The earliest activation sites of focal and micro-reentrant VTs. (2) Best paced map sites. (3) Critical isthmuses. (4) Potential conduction channels within low-voltage zones (LVZ). Endpoints included: (1) No induction of persistent VTs by isoprenaline and programmed stimulation; (2) Elimination of abnormal potentials in LVZs; (3) Connection of nearby barriers.
Results: There were 2 patients with previous myocardial infarction, 2 patiants with arrhythmogenic right ventricular cardiomyopathy (ARVC), and 1 patient with normal heart structure. There induced an average of 3.4±3.0 VTs in each case with mean cycle length of 389.0±122.4 ms. Two cases only received endocardial voltage mappings of targeted ventricles and endo-cardial LVZ was found in one of them (112.0 cm^2). Three cases received both endo - (321±93 points) and epi-cardial (302±158 points) voltage mapping in targeted ventricles during SR and LVZs were detected in two of them. Epi-LVZ areas were larger than endo-LVZ areas in the two cases (100.2±17.7 cm^2 versus 48.0±41.1 cm^2). No acute adverse events were observed. None suffered from ICD shocks during an average of 24.8±13.7 months' follow-up. One patient has been hospitalized for heart failure for three times post-procedure. His present heart function is NYHA grade III, the same with pre-procedure.
Conclusions: Substrate mapping is helpful for complicated VTs due to ICD-ES.

GW25-e4375

Early clinical experience of left atrial appendix occlusion using LAmbre™ device from a 7-case series

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Objectives: Left atrial appendix is the main origin of thromboembolus that causes ischemic stroke in the patients with atrial fibrillation (AF). Percutaneous left atrial appendix occlusion (LAAO) is a potential method for prevention of stroke. In these series, we performed LAAO using novel LAmbre™ device, to detect its abilities of occlusive effectiveness, percutaneous operability and safety.
Methods: Patients with non-valvular AF that were intolerant to warfarin therapy were recruited after performing a rigorous exclusive screening. Suitable LAmbre™ device were selected by coronary angiography and released into LAA, prior to assessment of residual shunt by transesophageal echocardiography (TEE). Operability of device was evaluated by a same operator, objectively.
Results: Seven patients with non-valvular AF that received irregular warfarin therapy were selected out, after exclusion of 1 in 8 cases as existence of mural thrombus detected by TEE. Among all 7 inclusive cases, 6 were female and 1 was male, 6 were permanent AF and 1 was paroxysmal AF. The average age was 67±7. Four had a history of prior stroke and/or transient ischemic stroke. $CHADS_2$ score was 2.7±1.25 and international normalized ratio (INR) was 1.3±0.72, including only 1 reached the target (INR 2-3). Pre-procedural ejection fraction of left ventricle was 61±6.9 percent. Under continuous monitoring of TEE, all cases underwent LAAO using LAmbre™ devices. Five no, 1 slight and 1 mild residual shunts indicated all success of procedures. Average time-cost was 70±16.9 minutes. There were also satisfied evaluations of supporting, contrastive, stable and positioning abilities for the devices. These patients underwent uneventful recovery. The time between the procedure and discharge was 3±0.5 days.
Conclusions: Percutaneous left atrial appendix occlusion with LAmbre™ device was safe and effective, however, long-term follow-up should be evaluated closely.

GW25-e4609

Effects of left ventricular lead position on cardiac resynchronization therapy in heart failure of different etiologies

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Objectives: Cardiac resynchronization therapy (CRT) was an established treatment of chronic heart failure for nearly 20 years. Myocardial ischemia is an independent predictor of CRT no response, and high cardiovascular mortality after CRT and high hospitalization rate. Patients with ischemic cardiomyopathy could benefit from CRT, but occurs to a lesser degree. In addition, an optimal position can significantly improve CRT response rate, but it is not clear that weather the same left ventricular lead position in heart failure patients of different etiology would have the same effect.
Methods: From 2001 March to 2012 December, 187 heart failure patients treated with CRT and finished 6 months follow-up were enrolled in this study, the patients were from 3 medical centers. Left ventricle lead were placed through thoracic epicardium in 3 cases, the remaining 184 cases were through venous. The LV lead was implanted preferably in the lateral or posterolateral vein. Right ventricular lead positioning at septum were depended on fluoroscopic imagine and electrocardiogram, as Lieberman discribed. From coronary sinus to the apex, the heart was classified into basal, mid-ventricular (MID), and apical segments along the long axis at right anterior oblique (RAO) view of venogram. The pacemaker was programmed to maximum biventricular pacing, the output voltage were reduced as far as possible to extending battery life. Before and after the implantation of pacemaker, 12 lead ECG were recorded (25 mm/s), QRS duration in II, V1 and V6 were measured by two doctors independently.
Results: NYHA symptom class, 6-MWT, LVEDD and LVEF were significantly improved at 6 months in NICM group (P<0.01), NYHA symptom class, 6-MWT and LVEF improved in ICM group at 6 months (P<0.01), while LVEDD did not improved. The improvements in NICM were more obvious than ICM group (P<0.01). The improvement of NYHA class and LVEF in NICM group when LV lead placed in the middle segment is more obvious than placed in the basal segment (P<0.05-0.01). And the improvement of NYHA class, LVEDD and LVEF is more significant than LV lead placement in the apical segment (P<0.01), and the absolute improvement value of all heart function characters were more significant compared to the LV lead placed in basal and apical segment. In ICM group, the improvement of LVEDD when LV lead positioning in the basal segment was more obvious than in the middle segment (P<0.05), and all the indexes were improved more obviously than in apical segment (P<0.05-0.01), the absolute improvement value were more significant compared to middle and apical segment.
Conclusions: The treatment with CRT can obtain certain curative effect for heart failure patients of ICM, but not as good as NICM, especially if the left ventricular remodeling cannot reverse. The best position of LV lead in NICM was basal heart, while for ICM patients the best position is middle heart.